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Social Capital and Economic Development

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Abstract

The paper reviews the literature on social capital and development and identifies key properties of this concept that are then used in a model illustrating the potential welfare effects from social capital, in terms of both wellbeing and economic benefits. The model focuses on access to inputs into the growth process and identifies necessary conditions for benefits from social capital in terms of the availability of the right kind of intermediary making access to capital resources possible, and the presence of supportive institutions which make minimum human capital and complementary goods available.

JEL Codes: O16, O43, Z13

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1. Social capital in development studies

The concept of social capital surfaced in the development literature almost simultaneously over the past fifteen years in quite separate places. Ahn and Ostrom (2008) in the Handbook of Social Capital make quite clear the concept has two distinct lines of heritage and associated criticisms: on the one hand the traditional neoclassic economic viewpoint the concept simply refers to the 'cooperation enhancing effects of repeated interactions and networks' and finds the concept essentially redundant (given reputation, trust and networks are all separately defined and rigorously studied already); from the perspective of collective-action theorists and behavioural economists, social capital offers a useful framework for studying the emergence of cooperation. The literature on the evolution of institutions has also used the concept, albeit rather loosely, in the context of informal institutions which play a very significant role in shaping formal institutions and the operation of markets, and can emerge as the preponderant rules of interaction when formal institutions and markets fail. In this context, social capital becomes central because the 'power of an actor' is directly measured by 'the social capital available to the actor within that system, which is ruled by both informal and formal institutions: some actors only have access to primary and non cross-cutting social networks which limit their sphere of action (e.g. poor, low-caste, or women in some contexts), others can access both cross cutting social networks and institutional capital (Casson et al, 2010).

Coleman is the author who can be credited with expressly introducing the concept of social capital as a key feature of the structures of social action[i]. He describes social capital both as social organisations and as 'not a single entity, but a variety of

different entities having two characteristics in common; they all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within the structure' (Coleman, 1990, p.302). These entities in turn comprise obligations and expectations, information potential, norms and effective sanctions, authority relations, and appropriable social organisations. Social-structural resources can be considered as a capital asset to the individual, in the sense that it is individuals belonging to the structures who can use this form of capital as a productive resource. In particular, Coleman describes relationships in linear closed systems (i.e. those capable of establishing and maintaining effective norms) in terms of the expectations and obligations that bind each individual to the others. In this context, the social capital available to an individual is simply the sum of all the obligations running towards her from all other individuals. As the fundamental hypothesis is that each individual has some control over the others' actions, the more they are obliged and the higher such control will be. In Coleman's words the 'power of an actor' is 'a direct measure of the social capital available to the actor within that system'.

Coleman describes social capital as a good with a number of properties: it is not completely fungible and, akin to knowledge, it has certain public goods features, generating social returns higher than private ones and, as a consequence, under-investment on the part of individuals. Intended investment in this construction does in fact not take place, as the self interested individuals on which the theory is based have no interest in producing something the benefits of which accrue to other individuals, so social capital comes about as a by-product of other activities.

Putnam's use of the concept in the context of explaining different regional performances in Italy (Putnam, 1993) has then generated a wide debate regarding both his interpretation of Italian history, his postulated directions of causality (from social

capital to institutional performance to economic development), the assumptions regarding the initial distribution and production of social capital, the proxies used to measure it, and ultimately the usefulness of the concept itself. Some writers reject the notion that social networks can be viewed as 'capital' in the traditional sense of yielding returns or of being depleted with use (Ostrom, 1997); Manski (2000) prefers to avoid the use of the term altogether, whilst Mosse thinks that 'The attempt to synthesize the social and the economic in a theory of "social capital" poses questions about the relationship between norms, networks, associations, and collective action, but it also introduces unresolved problems: too many different social phenomena are bundled together, and the statistical concept of social capital is unable to grasp the historical dynamic between collective action, associations, and democratic practice. As theory, social capital is too vague about the mechanisms by which social interaction produces values or collective action, and as policy its causal relations are too unidirectional (from associations to collective action or democratic process) to be useful (Mosse, 2006, p. 720).

In spite of this, or perhaps because of it, Putnam's definition 'features of social organisations, such as trust, norms and networks, which can improve the efficiency of society by facilitating co-ordinated actions' is perhaps the most widely cited in the development literature (see Table 1), and most of social capital proponents in the development literature view it as a useful notion that can help reintroduce the 'social' in the development agenda, and point to its instrumental value in allowing access to resources, especially for the poor (World Bank, 2000).

Table 1: Definitions of social capital

Coleman, 1988	Aspects of social structure (obligations, expectations and

	trustworthiness of structures, information channels, norms and effective sanctions) that facilitate the actions of individuals within that structure.
Putnam, 1993	Features of social organisations, such as trust, norms and networks, which can improve the efficiency of society by facilitating co-ordinated actions.
Collier, 1998	Social interaction which has the effect of generating a durable externality.
Grootaert, 1998	Set of norms, networks and organisations through which people gain access to power and resources.
Falk, 1998	Knowledge resources and identity resources on which people draw to generate social and economic outcomes.
World Bank, 2000	Ability of individuals to secure benefits as a result of membership in social networks or other social structures.
Portes and Landolt , 1996	The capacity of individuals to command social resources by virtue of their membership in networks or broader social structures.
Sobel 2002	Circumstances in which individuals can use membership in groups and networks to secure benefits

Source: Della Giusta and Kambhampati (2006)

Levels of social capital

At the micro level, social capital coincides with social networks formed by individuals with intermediaries that facilitate access to human, financial and physical capital. These social networks can be small or large, and include few or many intermediaries of each type. They can also be more or less close, so that for instance

an individual may be member of a group which does not include the right type of intermediaries, or, at the opposite end of the spectrum a privileged group may shut other groups out from accessing their intermediaries. It is clear that exclusive loyalty within primary social groups is not per se able to ensure material and immaterial benefits and can sometimes in fact hinder the very possibility, as witnessed by the work on intra-household conflicts and unequal allocation (Schultz, 1990; Lundberg and Pollak, 1994, 2003; Dobbelsteen and Kooreman, 1997; Chen and Woolley, 2001), by the exclusion at village level of the poorest from group-based microfinance (Rogaly and Roche, 1998; Morduch, 1999 and 2000; Paxton et al 2000; Gomez and Santor, 2001) and the costs and benefits associated with family- or ethic group based businesses networks (Ben-Porath, 1980; Sivramkrishna and Panigrahi, 2002; Haddad and Maluccio, 2003).

Bridging (horizontal links) and linking (vertical links) are thus identified as crucial to micro-level social capital: access to networks of secondary associations with more heterogeneous membership (within which ties may cut across ethnic, caste, class, wealth, religion, location or other characteristics) has been described in the literature as key to accessing resources and opportunities, as well as being capable of complementing the role of the government and even providing a substitute in areas in which government policy is ineffective. Key to such bridges are individuals who are well placed to connect different groups endowed with different resources, which have been well documented amongst others by Krishna (2002) and Della Giusta (1999 and 2006) but have otherwise not been very prominent in the development literature.

Another important feature of trust-based connections is that they display economies of scope, in the sense that trust is based on successful interaction which is mutually beneficial in achieving a specific purpose (for example, accessing finance), but the

same connections may be very useful for achieving related purposes (for example, accessing training) but totally unsuited for achieving goals that are widely different from the original (for example, accessing political representation) (see evidence of this in Casson and Della Giusta (2004 and 2006)). The result is that specific agency is exercised by different connecting individuals in different fields, as clearly illustrated by Krishna in his Indian study where different agents operate for economic development, for community peace, and for political participation (Krishna, 2002). Again, there can be downsides to bridging networks as well, as witnessed by the existence of exploitative and patronage-based relations.

At the macro level, social or institutional capital describes the connection individuals have with institutions and their ability to avail themselves of their services; it thus involves local government institutions that both enable the scaling-up of micro level social capital and actually contribute to creating social capital. Institutions can do this by creating conditions that are favourable to entering and maintaining social networks on the one hand, and through social policy and the attitude they promote in public officials, on the other (see Lam, 1996 and Wade, 1985). Thus, if government institutions are not supportive it may be impossible for people belonging to certain social networks to scale up to macro-level social capital. The informal economy can in this sense be interpreted as a failure of scaling up from micro level to institutional social capital, which can be motivated by institutional failure, as well as lack of connecting individuals helping to build bridges across networks.

A sticking point in the debate on the use of the notion of social capital by the World Bank and by extension the major development organisation has been the emphasis on the possibility of investing in social capital (sometimes even ‘injecting communities with social capital’) by fostering associations and ‘facilitating’ participation. Among

many others Edwards, a former World Bank officer, describes the failure of lending programmes for investment in social capital (for example Russia and the Balkans), associated with "picking winners by pre-selecting certain organisations (usually urban-based NGOs and networks of the civic elite), spreading rivalry and creating backlash effects when such associations are identified with foreign interests; these are not genuine efforts to support civil society but misguided attempts to manipulate its shape in accord with Western liberal norms" (p. 56, 1999). Perhaps social capital is better understood as an example of irreducibly social good, more similar to culture than public goods provision. Taylor suggests that culture consists of "objects of value which cannot be decomposed into individual occurrences in the sense that they cannot be reduced to a set of acts, choices or other predicates of individuals; individuals cannot by definition possess such goods, rather they are features of societies" (p. 24, 1990). The difference between social goods and public goods is that public goods are only instrumentally valuable, whereas social goods essentially incorporate common understanding of their value and are irreducible features of society as a whole; in this sense culture as 'common understanding'[ii]. This then means that social goods can only be produced by a whole society, ruling out the possibility of creating or selecting privileged actors in the process. Access to both networks and institutional capital obviously depend on historically and culturally determined power relations.

The view adopted here is that social capital has both instrumental and intrinsic value, (Della Giusta, 1999 and 2003). An approach that views social capital as intrinsically valued by individuals as their well being is increased by belonging to social networks is also consistent with the recent literature on happiness and well-being which suggests that social capital (in the form of relationships and trust) is a major factor in explaining differences in happiness (Kahneman and Krueger, 2006; Layard, 2005;

Frey and Stutzer, 2004). Layard points out that 'key aspects of social capital, like trust and membership in voluntary associations, contribute greatly to happiness' (p.179). A vast literature now connects various social and economic variables to well being and happiness indicators, which are increasingly being adopted alongside traditional income ones in policy evaluation (Di Tella and MacCulloch, 2006; Di Tella, et al, 2003)

Empirical studies

There is now a vast empirical micro and macro literature relating indicators of networks density, trust and associationism to economic development (some of the most cited include Miguel et al, 2003 and 2006; Grootaert, 1999; Narayan and Pritchett, 1997; Knack and Keefer, 1997), which contains a variety of proxies for social capital indicators. The first macro studies of the latter part of the 1990s were usually relying on data on trust variables and incidence of associations from values and social surveys which were then used as explanatory variables in cross-country growth regressions, but recent studies by Miguel and others addressing the link between these proxies and industrialization in Indonesia find that high initial levels of social interaction in a district do not predict subsequent industrialization, and that industrialising areas see higher social networks density developing rather than the other way around. These studies also show that there is an important effect of migration and industrialization in nearby areas, which leaves some areas with declining social networks (Miguel et al, 2006).

Perhaps more interesting are the results found by micro level studies (as Haddad and Maluccio 2003, who investigate the effect of networks membership on household welfare), which often devise context specific proxies for trust and networks

membership and model the interaction between these and a variety of development outcomes in a more complex way. Krishna (2002) uses data from Indian villages to illustrate the fundamental role of agency in ensuring that members of existing social networks can access a variety of resources, and stresses how the presence or absence of such agency is key to the process of development (in the form of material benefits as well as peace and political participation) through social capital. Cleaver (2005) provides a very useful example of the ways in which the very poorest in Tanzania cannot benefit from social capital, having social networks among other poor people who cannot help them and lacking institutional capital. This study provides also a powerful reminder of the dangers of the frequent conflation within the literature of individual and household, which as stated above is problematic as the household can itself be a source of exclusion for some of its members. Cleaver's study illustrates the situation of women in wealthier households who have however no access to resources and whose position in similar to those of very poor households. Furthermore, by illustrating the interlocking disadvantages experienced by poor households (small family size and weak family networks, lack of assets -including labour power- which constrains their ability to engage in reciprocal collective activities, poor health, inability to articulate in public fora and the derogatory perceptions of other community members towards them), this study highlights the frequently forgotten complementarity between social and other forms of capital: social capital cannot be understood as a ready substitute for other missing capitals (human, natural, financial).

Results highlighting both the role of missing capitals and the complementarity between micro and institutional social capital were obtained in our studies of social capital and microfinance in Mexico (Della Giusta 1999 and 2000; Casson and Della

Giusta, 2005) and of social capital and the wellbeing of immigrant women in the UK (Della Giusta and Kambhampati, 2006).

2. Modelling social capital and economic development

The model that follows incorporates insight gained from empirical work, particularly relative to the need for suitable intermediaries and for complementary forms of capital (particularly human capital and complementary goods) and supportive institutions, into a framework in which individuals value their social relations and want to fulfil obligations (intrinsic value of social capital) and can gain access to capital inputs through their relations (instrumental value).

The model assumes that individuals are concerned about the reputation effects from their observable interactions (an important point to include explicitly for a village or local neighbourhood setting in which this is likely to be the case) and investigates the conditions under which both higher social capital and economic development (in the form of higher income) can simultaneously be achieved. Such conditions include supportive local government institutions, which make human capital (and complementary goods) available, and suitable intermediaries, although this is not explicitly modelled in this paper (for a model of the role of intermediating institutions see Della Giusta, 1999, and for a model of the role trust brokers see Della Giusta, 2005). The assumptions are in line with findings from the literature in experimental economics and neuroeconomics which is producing interesting results which deviate from what expected by the theory on microfoundations by examining brain processes taking place performing actions and assessing perceptions and the formation of beliefs (Fehr et al, 2005). This literature documents the deviation from self-interested

behaviour, the emergence of social norms, and the general economics of reciprocity (Sobel, 2005; Smith, 2003; McCabe et al, 2003; Fehr and Gaechter, 2000). Using both evidence from psychological studies and social policy, as well as experiments, these studies show how notions of reciprocity inform actors behaviour and how individuals are willing both to punish people who violate norms and incur costs in doing so (Fehr and Fischbacher, 2004). There is also evidence which links responses of the brains of actors playing a trust game indicating that trust develops as a response to reciprocity (King-Casas et al, 2005), which confirms the interpretations of the workings of the brain given in experimental economics (Zak et al, 2005; McCabe et al, 2003). Similar modelling in the development literature has recently appeared (see Sethi and Somanatan; 2006; Routledge and von Amsberg, 2003; Francois, 2002) although these models focus on interactions which are not observed by outsiders, which is not necessarily useful when focusing on the restricted context in which many poor people live, and rely on having the 'right' proportions of trustworthy individuals and entrepreneurs or the right amount of successful transactions for development to happen, which rather obscures the process involved in the use of social capital and brings back to whether there is 'enough' of it.

The formal structure follows the structure of the Ramsey growth model (Aghion and Howitt, 1998), introducing a new input in agents' preferences, reputation, in order to investigate issues of micro and macro (or institutional) social capital and access to financial capital. Two types of agents exist, capital intermediaries, who can access capital and engage in financial intermediation (they can be thought of as traders, or moneylenders), and agents who do not possess capital and therefore must borrow in order to engage in an unspecified production process. Two alternative lending mechanisms are considered: it is possible to either borrow from intermediaries on an

individual basis, for an interest rate that is determined by the lender on the basis of its profit maximisation, or organise jointly liable borrowing groups which use their reputation as collateral, and borrow at an interest rate that is determined on the basis of financial sustainability (revenues covering costs). Reputation-based mechanisms are modelled and their connection to individuals and group's repayment performance investigated. The fact that borrowers are economically vulnerable is modelled with the introduction of shocks, and parameters are introduced representing the behaviour of local government institutions, to take account of their effect on the income vulnerability of borrowers and their possibility of accessing the credit market. A list of variables is introduced first, followed by a description of the functioning of the credit system. Then the two sides of the economy (lenders' and borrowers' choices) are analysed separately and the conditions for system equilibrium are discussed. Results are presented together with a summarising diagram and possible extensions are suggested.

List of variables (bold for endogenous variables, normal for parameters)

N = population

$\boldsymbol{n^e}$ = borrowers without reputation

$\boldsymbol{n}$ = individual borrowers

$\boldsymbol{n'}$ = group borrowers

$(n+n')/N = \gamma$ = proportion of n^e re-introduced in the credit market through local government institutions livelihood-supporting intervention

$\boldsymbol{y_h}$ = borrowers income

$\boldsymbol{c_h}$ = borrowers consumption

l_h = borrowers units of labour (fixed and constant across borrowers)

b_h = fixed size capital loan per borrower

μ_h = borrower's reputation

q = proportion of repaying borrowers in individual lending

q' = proportion of repaying borrowers in groups lending

ρ = proportion of borrowers in individual lending that are unable to repay due to a production shock

ρ' = proportion of borrowers in groups lending that are unable to repay due to a production shock

ext_μ = reputation effect that exists in groups

p = interest rate on capital for individual borrowers

p' = nominal interest rate on capital in groups

$p'\{1+[(1-q')/q'][(1-\varepsilon_1)(1-\rho')+(1-\varepsilon_2)\rho']\}$ = effective interest rate on capital for groups

ε_1 = proportion of voluntarily defaulting borrowers punished with expulsion

ε_2 = proportion of involuntarily defaulting borrowers punished with expulsion

i = productivity of capital

* = indicates equilibrium values

The subscript $_h$, indicates values of variables for borrowers belonging to groups, when these differ from the values for borrowers in individual lending.

Functioning of the credit system

There initially exist two types of agents in the economy: agents (all identical to each other and denoted with the *l* subscript), that are endowed with capital and engage in money lending –henceforth moneylenders-, and agents (all identical to each other and denoted with the *h* subscript), that are endowed with labour (all with the same amount per agent) and reputation (μ) and borrow capital to engage in production. The income

generated in production accrues partly to the lenders, through the flow of repayments from repaying borrowers, and the rest is consumed. Agents endowed with reputation can access credit either via individual lending from moneylenders, or through groups lending. Within both credit arrangements each agent endowed with reputation receives a fixed capital loan of size b_h, which is renewed upon repayment of interest. Moneylenders charge a higher interest rate on loans than the nominal interest rate charged in groups lending. Due to joint liability within the latter, however, repaying borrowers must repay for part of the defaulting borrowers, so that the effective interest rate is higher than the nominal whenever default is present. Both types of lenders are assumed to have two different responses to borrower's default, which depend on the reason for defaulting. In particular, they are able to expel only a part (ε_1) of voluntary defaulters, and are prepared to help only a part (1-ε_2) of involuntary defaulters. Involuntary default takes place when a production shock occurs, thereby impairing repayment. The present construction assumes that ε_1 and ε_2 are identical for both types of lenders, in order to underline only outcomes caused by differences in the lending mechanisms based on a different consideration of borrowers' preferences, rather than based on differing attitudes towards default[iii]. Re-entering borrowing once reputation has been lost is only possible through local government institutions intervention (for example they are targeted by a special credit programme)[iv].

The crucial variables explaining the micro-level social capital dynamics are the repayment rates, and particularly their response to the characteristics of the credit markets (relative magnitude of n, n' and n^e), credit providers' attitude towards default (ε_1 and ε_2) and their relationship with the local government institutions' reputations (parameter γ)[v]. All agents with identical endowments of labour and capital have an identical production function and generate an identical level of income y_h, which is

used for repayment and consumption. Consumption will then be higher in case of default. Moreover, when default is punished, c_h will be higher (being expelled from lending, the borrower will consume the loan[vi]) than in the case of unpunished default (involuntary defaulters in both markets lose a part of their production as a result of the shock equal to pb_h). The capital stock in the economy at any time is simply the sum of all loans made to borrowers:

$$K = b_h (n + n')$$

and the depreciation flow is the sum of all loans consumed by punished defaulting members:

$$\partial K = \{(1-q)[\varepsilon_1(1-\rho)+\varepsilon_2\rho] + (1-q')[\varepsilon_1(1-\rho')+\varepsilon_2\rho']\} K$$

Through repayments additions are made to the capital stock, as repayments enable the lenders to make new loans, once deducted their costs (C_l).

Overall, the dynamic of capital in the economy is described by:

$$\dot{K} = Y - C - (\partial K + C_l) \qquad \text{(Equation 1)}$$

where C is total consumption and Y total income.

Repayment implies renewal of the loan and conservation of the borrower's reputation, so that reputation is maintained through repayment or unpunished default, and lost with punishment. The stock of reputations present in the economy at any point in time is simply the sum of all reputations present:

$$\mu = \mu_h (n + n')$$

and the depreciation flow is:

$$\partial\mu = \{(1-q)[\varepsilon_1(1-\rho)+\varepsilon_2\rho] + (1-q')[\varepsilon_1(1-\rho')+\varepsilon_2\rho']\}\mu$$

The gross investment flow coincides with the repayments flow, so that overall, the dynamic of reputation in the economy is described by:

$$\dot{\mu} = Y - C - \partial\mu \qquad \text{(Equation 2)}$$

Borrowers' choice

Borrowers' preferences include both consumption (c_h) and reputation (μ_h), and they face two sets of choices: which type of lending market to enter and, once in it, whether to comply with repayment obligations. Borrowers maximise utility under two dynamic budget constraints: the constraint determined by the availability of reputation ($\dot{\mu}_h$), and the constraint on production determined by the availability of capital ($\dot{k}_h$). However, the constraints differ between the two markets, so that two separate maximisations are carried out to describe borrowers' choice in the two cases[vii].

$$U(c_h, \mu_h) = c_h^{\beta} \mu_h^{1-\beta}$$

Choice in this well known framework derives from dynamic optimisation, but what distinguishes this model is that reputation is a variable with both intrinsic and instrumental value: it is desired per-se (provider of utility) and used to access credit (intervening production factor). The optimisation is therefore carried out considering two control variables, c_h and μ_h and two state variables μ_h and k_h (with reputation being both a control and a state variable to reflect its double function). The maximisation yields a relationship between the optimum growth rates of consumption, and of reputation and an expression for the productivity of capital as a function of the consumption to reputation ratio, the rate of capital (and reputation) depreciation, and the ratio of the partial elasticity of utility with respect to reputation over the partial elasticity of utility with respect to consumption. In particular, given that capital productivity coincides with the interest that households are prepared to pay for capital, the interest rate for both individual and group borrowing will increase the higher the proportion of punished defaulters, the lower the ratio of consumption to

reputation, and the higher the relative preference given to consumption in utility (please see appendix for derivation of these results).

Lenders' choice

Individual lenders maximise profits choosing a scale of operations (n) so as to maximise the difference between revenues and costs, determining the optimum value for the rate of interest on capital (p^*). Let c_l be the fixed costs per borrower faced by the lender (these costs include all the activity's costs –screening, monitoring, enforcing-, including the reward to the lender), and n be the size of the individual lending market, so that $c_l n$ provides the total fixed costs, $pb_h qn$ is the repayments (revenue), and $b_h(1-q)n[\varepsilon_1(1-\rho)+\varepsilon_2\rho]$ is the capital lent to punished defaulters, that is the capital losses. If $n^e\ n/N$ is the flow of new borrowers in individual lending, and $b_h\ n^e\ n/N$ are new loans made to the re-introduced borrowers, then profits[viii] will be given by:

$$\pi = pb_h qn - c_l n - b_h(1-q)n[\varepsilon_1(1-\rho)+\varepsilon_2\rho] - b_h\ n^e\ n/N$$

the maximisation of π with respect to n allows one to derive the optimum value for p:

$$p^* = \left(c_l / b_h + n^e / N\right)\cdot 1/q + (1-q)/q \cdot \left[\varepsilon_1(1-\rho)+\varepsilon_2\rho\right] \quad \text{(Equation 3)}$$

Groups' lending constitutes an alternative mechanism for accessing credit, and is based on the external effect to reputations that exists in groups and that acts as a further incentive to repayment which is absent in individual borrowing. Their financial constraint is that revenues cover costs, and this determines the nominal rate of interest on capital[ix] (p'^*). Due to joint liability, repaying borrowers also repay for unpunished defaulters, so that the individual repayment from each borrower is:

$$p' b_h \{1 + [(1-q')/q'][(1-\varepsilon_1)(1-\rho')+(1-\varepsilon_2)\rho']\} \quad \text{(Equation 4)}$$

and, if the group lending market size is *n'*, revenues can also be calculated. All other conditions being analogous to those faced by individual lenders, profit is simply the difference between revenues and costs and maximising this yields the interest charged in group lending as:

$$\left(\frac{c_l}{b_h}+\frac{n^e}{N}\right)\cdot\frac{1}{q'}+\frac{1-q'}{q'}\cdot\left[\varepsilon_1(1-\rho')+\varepsilon_2\rho'\right] \qquad \text{(Equation 5)}$$

Equilibrium conditions and results

To achieve equilibrium, three conditions must hold: firstly, for both lending arrangements to exist simultaneously, the marginal and total utility for a borrower must be the same when choosing individual or group borrowing. Secondly, given that there are no differences in the level of technology and in the quantity and quality of labour used by borrowers in production, the productivity of capital must be the same. Finally, the equilibrium of demand and supply requires that the price borrowers are prepared to pay for capital equals the effective cost of borrowing determined by the prices set by the lenders.

Thus the first condition (simultaneous existence of the two markets) states:

$$U(c_h, \mu_h) = U(c_{h'}, \mu_{h'})$$

Substituting the Cobb-Douglas utility functions yields:

$$c_h / \mu_h = c_{h'} / \mu_{h'} (\mu_{h'} / \mu_h)^{1/\beta} \qquad \text{(Equation 6)}$$

The presence of the external effect to reputation in groups ($\mu_{h'} > \mu_h$) means that:

$$c_h / \mu_h > c_{h'} / \mu_{h'} \qquad \text{(Equation 7)}$$

and:

$$c_h > c_{h'} \qquad \text{(Equation 8)}$$

Note that, further to this, marginal utilities also have to be identical for the equilibrium to be stable, and this produces the same conditions stated in eq.7 and 8[x]. The second equilibrium condition (identical capital productivity) requires that (eq. 9):

$$(1-q)[\varepsilon_1(1-\rho)+\varepsilon_2\rho]-[(1-\beta)/\beta]\cdot c_h/\mu_h=(1-q')[\varepsilon_1(1-\rho')+\varepsilon_2\rho']-[(1-\beta)/\beta]\cdot c_{h'}/\mu_{h'}$$

And the final equilibrium condition (intersection of demand and supply) requires, substituting the optimum values from the households' and lenders' optimisations in the individual lending market that (eq. 10):

$$(c_l/b_h+n^e/N)\cdot 1/q'+(1-q')/q'[\varepsilon_1(1-\rho')+\varepsilon_2\rho']=$$

$$=(c_l/b_h+n^e/N)\cdot 1/q+(1-q/)q[\varepsilon_1(1-\rho)+\varepsilon_2\rho]$$

Considering together equations (7), (9) and (10) allows to determine[xi] the result that the repayment rate in groups lending is higher than in individual lending:

$$q' > q \qquad \text{(Eq. 11)}$$

with the actual values of q and q' being determined by equilibrium condition 3.

Note also that if $q'>q$ and $\varepsilon_1 > \varepsilon_2$, from Eq. 10 follows that $\rho'< \rho$. The economic interpretation of this result is that a higher repayment in groups is associated with a lower exposure to production shocks for households that belong to them (i.e. when a reputation effect is present in a group, this indicates that the group also provides some kind of risk protection for its members).

The study of the equilibrium repayment values q and q' also shows that[xii]:

1) Repayment equilibrium rate is higher the lower the size of the loan relative to the cost of lending and the higher the share of excluded in the credit market.

2) Repayment equilibrium rate is higher the stricter the lenders (ε_1 and ε_2).

3) Repayment equilibrium rate is higher the smaller the relative preference given to consumption in utility, and the higher the equilibrium consumption/reputation ratio.

Extensions

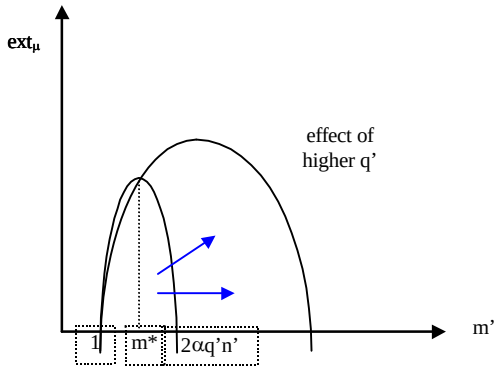
Modelling of the reputation effect in groups

It is interesting to further analyse the reputation effect in groups, particularly since an ongoing issue in the microfinance literature regards the determination of optimum values for group size (*m'**), considering at least some of the more controversial issues associated with social capital; most notably, the existence of potential negative sides at the level of the group, that have also been argued to have effects that propagate to the whole system. In order to describe explicitly the reputation effect in groups, the existence of group sizes for which such effect is decreasing, and even potentially negative must be therefore taken into account. A possible way for explicitly modelling the external reputation effect is to consider it as a function of its most likely determinants: group's size per se (the larger the size, the lesser the cohesion of the group), and weighted with repayment (the higher, the higher the more the group can get large before negative effects set it) and with diffusion of group lending (again the higher, the more the group can get large before negative effects set in).

If the effect takes the following form:

$$ext_{\mu} = -\frac{1}{2}\left(m'^{2} - 1\right) + \alpha\ q' n' \left(m' - 1\right) \qquad \text{(Equation 12)}$$

that is represented graphically below:



The optimum value for group size [xiii] can then be determined as that which solves:

$$\underset{m'}{Max}\ ext_{\mu}$$

generating the optimum value for *m'*:

$$m'^* = \alpha\, q'n' \qquad \text{(Equation 13)}$$

The corresponding level of external effect can be derived and calculated at the individual level as well, to enable comparisons of utility for different group structures.

Extension to individual lending

The same idea can be applied to the individual lending market, in this case to determine the minimum size for a lender. If entry in this sector faces a barrier determined by a reputation endowment (where the reputation of a lender is simply the sum of the reputations of its repaying clients), then such barrier could again be described in terms of some proportion of the level of borrowers' repayment rate (reflecting reputations, i.e. the consistence of social capital in the population of autonomous borrowers). The reputation barrier to entry for individual lenders would then help to determine a minimum size for each lender:

$$m^* \geq \alpha qn \qquad \text{(Equation 14)}$$

3. Conclusions

Several implications derive from the model's results:

1) Lending mechanisms based on social collateral (reputation effects) achieve higher repayment among their borrowers even when they have the same attitude towards default as individual profit-maximising lenders.

2) More borrowers can access credit (and therefore have higher income) with lending based on social collateral, than with individual lending.

3) The more the government shelters borrowers from shocks, the higher the compliance rates and the higher the number of borrowers that can access credit.

4) Social capital in the system is the sum of reputations, therefore it increases with diffusion of group lending together with government help.

The results of the model are supported by the literature on microfinance, particularly the relationship between successful microfinance institutions and complementary development institutions and governments[xiv]. The case for reputations being sufficient (and direct sanctions not being necessary) is in contrast with much of the literature on lending to governments and reputation (see the classic study by Bulow and Rogoff, 1989), however, note that the present model would also yield the same result if reputation was not intrinsically valued (that is if it was not a provider of utilty independent of its instrumental valued)[xv].

The most relevant implications from the model are those relating to the relationship between social capital and development, and particularly the importance of the existence of socially-based intermediaries in making possible access to markets for the poor, the importance of government investment both in direct support of borrowers' livelihoods, and in the social subsidy that they can provide as guarantors

of individual reputations *if* public officials are themselves respected and maintain a credible reputation by delivering public services efficiently.

Appendix

Individual borrowers' choice

Max $U(c_h, \mu_h) = \int_0^{\infty} e^{-\sigma t} c_h^{\beta} \mu_h^{1-\beta} dt$

under constraints: $\dot{\mu}_h = y_h - c_h - \delta\mu_h$

$\dot{k}_h = y_h - c_h - (\delta k_h + c_l)$

where $\delta = (1-q)[\varepsilon_1(1-\rho)+\varepsilon_2\rho]$

Hamiltonian:

$H = e^{-\sigma t} c_h^{\beta} \mu_h^{1-\beta} + h_1(y_h - c_h - \delta\mu_h) + h_2 (y_h - c_h - \delta k_h - c_L)$ (Eq. A.1)

$$\begin{cases} \dfrac{\partial H}{\partial c_h} = 0 \\ \dfrac{\partial H}{\partial \mu_h} = 0 \\ \dfrac{\partial H}{\partial \mu_h} = -\dot{h}_1 \\ \dfrac{\partial H}{\partial k_h} = -\dot{h}_2 \end{cases}$$

from the second condition: $h_1 = \dfrac{1-\beta}{\delta} e^{-\sigma t} c_h^{\beta} \mu_h^{-\beta}$

from the first and second condition: $h_2 = e^{-\sigma t} c_h^{\beta} \mu_h^{-\beta} \left[\beta\, c_h^{-1} \mu_h - \dfrac{1-\beta}{\delta} \right]$

then: $\dot{h}_1 = \beta \dfrac{1-\beta}{\delta} e^{-\sigma t} c_h^{\beta} \mu_h^{-\beta} \left(\dfrac{\dot{c}_h}{c_h} - \dfrac{\dot{\mu}_h}{\mu_h} \right)$

and $\dot{h}_2 = \beta e^{-\sigma t} c_h^{\beta} \mu_h^{-\beta} (1-\beta) \left(\dfrac{\mu_h}{c_h} + \dfrac{1}{\delta} \right) \left(\dfrac{\dot{\mu}_h}{\mu_h} - \dfrac{\dot{c}_h}{c_h} \right)$

substitution in the third condition yields:

$$\left(\frac{\dot{c}_h}{c_h} \right)^* = \left(\frac{\dot{\mu}_h}{\mu_h} \right)^*$$ (Eq. a2)

and substitution in the fourth yields:

$$i^* = \delta - \frac{1-\beta}{\beta} \cdot \frac{c_h}{\mu_h} \qquad \text{(Eq.a3)}$$

The condition for the value of the integral to converge requires that the rate of growth of utility be smaller than the inter-temporal discount rate:

$$\frac{\dot{U}}{U} < \sigma$$

that requires:

$$\beta \frac{\dot{c}}{c} + (1-\beta)\frac{\dot{\mu}}{\mu} < \sigma$$

given the result in equation (a2), the above condition becomes:

$$\frac{\dot{c}}{c} < \sigma$$

Group borrowers' choice

Max $U(c_{h'}, \mu_{h'}) = \int_0^{\infty} e^{-\sigma t} c_{h'}^{\beta} \mu_{h'}^{1-\beta} dt$

under constraints: $\dot{\mu}_h = y_h - c_h - \delta' \mu_h$

$\dot{k}_h = y_h - c_h - (\delta' k_h + c_l)$

where $\delta' = (1-q')[\varepsilon_1(1-\rho') + \varepsilon_2 \rho']$

Hamiltonian:

$H = e^{-\sigma t} c_{h'}^{\beta} \mu_{h'}^{1-\beta} + h_1(y_{h'} - c_{h'} - \delta' \mu_h) + h_2 (y_{h'} - c_{h'} - \delta' k_{h'} - c_l)$ (Eq.a4)

$$\begin{cases} \dfrac{\partial H}{\partial c_{h'}} = 0 \\ \dfrac{\partial H}{\partial \mu_{h'}} = 0 \\ \dfrac{\partial H}{\partial \mu_{h'}} = -\dot{h}_1 \\ \dfrac{\partial H}{\partial k_{h'}} = -\dot{h}_2 \end{cases}$$

from the second condition: $$h_1 = \frac{1-\beta}{\delta'} e^{-\sigma t} {c_{h'}}^{\beta} {\mu_{h'}}^{-\beta}$$

from the first and second condition: $$h_2 = e^{-\sigma t} {c_{h'}}^{\beta} {\mu_h}^{-\beta} \left[\beta \, {c_h}^{-1} \mu_h - \frac{1-\beta}{\delta} \right]$$

then: $$\dot{h}_1 = \beta \frac{1-\beta}{\delta'} e^{-\sigma t} {c_{h'}}^{\beta} {\mu_{h'}}^{-\beta} \left(\frac{\dot{c}_{h'}}{c_{h'}} - \frac{\dot{\mu}_{h'}}{\mu_{h'}} \right)$$

and $$\dot{h}_2 = \beta e^{-\sigma t} \, {c_{h'}}^{\beta} {\mu_{h'}}^{-\beta} (1-\beta) \left(\frac{\mu_{h'}}{c_{h'}} + \frac{1}{\delta'} \right) \left(\frac{\dot{\mu}_{h'}}{\mu_{h'}} - \frac{\dot{c}_{h'}}{c_{h'}} \right)$$

substitution in the third condition yields:

$$\left(\frac{\dot{c}_{h'}}{c_{h'}} \right)^* = \left(\frac{\dot{\mu}_{h'}}{\mu_{h'}} \right)^* \qquad \text{(Eq.a5)}$$

and substitution in the fourth yields:

$$i'^* = \delta' - \frac{1-\beta}{\beta} \cdot \frac{c_{h'}}{\mu_{h'}} \qquad \text{(Eq.a6)}$$

Demonstration that $q' > q$

Rewrite equation 10 as:

$$\frac{a}{q} - \frac{1-q}{q} = \frac{a}{q'} - \frac{1-q'}{q'}$$

where:

$$a = \left(\frac{c_l}{b_h} + \frac{n^e}{N} \right)$$

Rewrite equation 9 as:

$(1-q)\, e - d = (1-q')\, e' - d'$

where:

$$e = \left[\varepsilon_1 (1-\rho) + \varepsilon_2 \rho \right] \qquad e' = \left[\varepsilon_1 (1-\rho') + \varepsilon_2 \rho' \right]$$

$$d = \frac{1-\beta}{\beta} \cdot \frac{c_h}{\mu_h} \qquad d' = \frac{1-\beta}{\beta} \cdot \frac{c_{h'}}{\mu_{h'}}$$

Re-arranging and dividing by q yields:

$$\frac{(1-q)e}{q} = \frac{(1-q')e'}{q} + \frac{d-d'}{q}$$

that can be substituted in the first equation to obtain:

$$a\left(\frac{1}{q} - \frac{1}{q'}\right) = \frac{(1-q')e'}{q} + \frac{d-d'}{q} - \frac{(1-q')e'}{q'}$$

that can be expressed as:

(q-q')[a – (1-q')e'] = q' (d-d')

Now recall that:

d > d'

which means that the right hand side is positive, and observes the condition for the prices charged by group lenders to be positive:

a' > (1-q')e'

which implies that the term in square brackets on the left hand side is positive. The final implication is therefore that:

q' > q.

Study of the equilibrium values *q** and *q'**

The following study is carried out only for *q**, but it applies to *q'** as well.

Equilibrium condition 3 produces an equation of second order. For its solutions to exist, the following condition must hold on the equation's delta:

$(d-2e)^2 > 4e\,(a+e)$

It is possible to eliminate one of the possible solutions to the equation observing the expression for the interest rate can be rewritten as:

i = (1-q)e –d*

Given that:

i > 0*

and

0 < (1-q) < 1

the following condition must also hold:

2e-d > 0

and this leaves the equilibrium value for *q**:

$$q^* = \frac{2e - d - \sqrt{(d-2e)^2 - 4e(a+e)}}{2e}$$

that indeed produces values that belong to the region (0 , 1).

Derivatives of q^*:

$$\frac{\partial q^*}{\partial a} = \frac{1}{\sqrt{(d-2e)^2 - 4e(a+e)}} > 0$$

$$a = \left(\frac{c_l}{b_h} + \frac{n^e}{N} \right)$$

Repayment equilibrium rate is higher the lower the size of the loan relative to the cost of lending and the higher the share of excluded in the credit market.

$$\frac{\partial q^*}{\partial \rho} = \frac{1-q}{q}\left(-\varepsilon_1 + \varepsilon_2\right) < 0 \qquad if \quad \varepsilon_1 > \varepsilon_2$$

$$e = \left[\varepsilon_1(1-\rho) + \varepsilon_2\rho\right]$$

Repayment equilibrium rate is higher the stricter the lenders (ε_1 and ε_2) and, given that it is hypothesised that voluntary default is punished more than involuntary default ($\varepsilon_1 > \varepsilon_2$), this also implies that $\rho' < \rho$.

$$\frac{\partial q^*}{\partial d} = \frac{(2e-d) - \sqrt{(2e-d)^2 - 4e(a+e)}}{2e\sqrt{(2e-d)^2 - 4e(a+e)}} > 0$$

$$d = \frac{1-\beta}{\beta} \cdot \frac{c_h}{\mu_h}$$

The repayment equilibrium rate is higher the smaller the relative preference given to consumption in utility, and the higher the equilibrium consumption/reputation ratio.

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[i] Although he credits the definition to Loury, who defined it as the set of resources that inhere in family relations and in community social organisation and that are useful for the cognitive or social development of a child or young person (Loury, 1977).
[ii] On irreducibly social goods see again Sen' entitlement approach (1981) and a useful critique by Gore (1997).

[iii] Thus for the individual lending market there will be qn repaying borrowers, $(1-q)n$ defaulting borrowers, $(1-q)[\varepsilon_1(1-\rho)+\varepsilon_2\rho]$ defaulting borrowers punished by moneylender with loss of reputation and non renewal of loan, and $(1-q)[(1-\varepsilon_1)(1-\rho)+(1-\varepsilon_2)\rho]$ defaulting borrowers that are not punished by moneylender. For the groups lending market, analogously, there will be $q'n'$ repaying borrowers, $(1-q')n'$ defaulting borrowers, $(1-q')[\varepsilon_1(1-\rho')+\varepsilon_2\rho']$ defaulting borrowers punished with loss reputation and non renewal of loan, and $(1-q')[(1-\varepsilon_1)(1-\rho')+(1-\varepsilon_2)\rho']$ defaulting borrowers that are not punished.

[iv] Thus if $N = n^e + n + n'$ is the population, n^e are agents outside the credit market, $\gamma = n^e (n + n')/N$= is the share of agents outside the credit markets that are supplied with reputation by the local gov. institutions in order to enter them, $n^e\ n/N$ are agents supplied with reputation by the local gov. institutions that re-enter individual lending market and $n^e\ n'/N$ are agents supplied with reputation by the local gov. institutions that re-enter groups lending market. The dynamic of n^e will therefore follow the expression $n^e \frac{n}{N} + n^e \frac{n'}{N} + n^e \frac{n^e}{N} = n^e$.

[v] This parameter reflects government contribution to the creation of social capital, in the form of supporting borrowers.
[vi] Borrowers do not save in this model, so if the loan is thought of in terms of equipment; in case of default this will be sold.
[vii] Given that the utility function has the same specification in both cases, borrowers are not prevented from borrowing in both markets simultaneously, a point that will be furthered when considering a condition on the marginal utility from borrowing in the two markets.
[viii] Note that profits are actual and not expected because the sources of uncertainty have been eliminated through the hypothesis of a deterministic approach to cheating that enables lenders to foresee default and incorporate the expected value of it in their calculation.
[ix] The effective interest rate on capital in group-lending is determined also by the repayment for a share of defaulting members to which repaying borrowers are compelled.
[x] Marginal utility in individual lending is $U'(c_h, \mu_h) = \left(\frac{c_h}{\mu_h}\right)^{\beta} \mu_h \left(\beta \frac{\dot{c}_h}{c_h} + (1-\beta)\frac{\dot{\mu}_h}{\mu_h}\right)$ and in groups lending $U(c_{h'}, \mu_{h'}) = \left(\frac{c_{h'}}{\mu_{h'}}\right)^{\beta} \mu_{h'} \left(\beta \frac{\dot{c}_{h'}}{c_{h'}} + (1-\beta)\frac{\dot{\mu}_{h'}}{\mu_{h'}}\right)$. Given the results on consumption and reputation rates from borrowers' optimisation, the condition on marginal utility requires $\frac{c_h}{\mu_h} = \frac{c_{h'}}{\mu_{h'}} \left(\frac{\dot{\mu}_{h'}}{\dot{\mu}_h}\right)^{1/\beta}$ which produces the same results as the condition on total utility.

[xi] See appendix for this.
[xii] Again, the underlying calculations are summarised in the appendix.
[xiii] That which maximises the group-level effect.
[xiv] In particular they confirm the analysis of Besley and Coate (1995) in what refers to the fact that social sanctions make group lending the preferred alternative with respect to repayment. Note however that elsewhere (Della Giusta 1999) a more detailed analysis of the parameters reflecting the punishment strategies adopted by lenders with respect to defaulting borrowers is discussed, and it is suggested that the presence of reputation effects in groups is not per se sufficient to ensure high repayment, as the latter depends on punishment graduation and choice of punishment intensity as well.
[xv] In Bulow and Rogoff the reason why reputation for repayment does not work because on losing its reputation by defaulting, the country can buy consumption-insurance contracts by paying cash in advance. This would be analogous to saying, in the present context, that borrowers can access a parallel savings-insurance market. Since reputation would then not be instrumental to access capital anymore, default would in this case indeed become the dominant strategy in both types of lending arrangements, but this would happen if and only if reputation also lost its second role of provider of utility. The latter

might certainly be assumed in the case in the context of a country borrowing on the international financial markets, but in the present case it would mean making a completely different set of assumptions concerning individual's behaviour, which would of course alter all the results from the model.